

ABSTRACT OF THE DISCLOSURE

SCAN AND REPEAT HIGH RESOLUTION PROJECTION LITHOGRAPHY SYSTEM

A scan and repeat lithography system is described for producing precise images of a pattern that is present on a mask onto a substrate. This scan and repeat lithography system has high resolution capability, large effective image field size, and high substrate exposure speed, and comprises: (a) a substrate stage capable of scanning a substrate in one dimension and, when not scanning in said dimension, capable of moving laterally in a direction perpendicular to the scan direction so as to position the substrate for another scan; said substrate stage thus being capable of exposing the full substrate by breaking up the substrate area into a certain number of parallel strips, and exposing each of said strips by scanning the length of the strip across a fixed illumination region; (b) a mask stage capable of scanning in the same dimension as, and synchronized with, the substrate stage, at a speed faster than the substrate stage scanning speed by a certain ratio M; (c) an illumination subsystem having the desired characteristics of wavelength and intensity distribution, having an effective source plane in the shape of a polygon, and capable of uniformly illuminating a polygon-shaped region on the mask; (d) a projection subsystem for imaging the said polygon-shaped illuminated region on the mask onto the substrate, having an object-to-image reduction ratio M, having the desired image resolution, and having an image field in the shape of a polygon and of an area smaller than the desired effective image field size of the said lithography system; and (e) provision of complementary exposures in an overlap region between the areas exposed by adjacent scans in such a way that a seam in the exposure dose distribution received on the substrate is absent between the said scans, and such that the exposure dose delivered across the entire substrate is uniform.